REMARKS/ARGUMENTS

In response to the Office Action mailed August 24, 2005, Applicants amend their application and request reconsideration. In this Amendment no claims are added or cancelled so that claims 1-10 remain pending.

There are two pending independent claims which are discussed separately. Claim 1 is directed to a semiconductor laser that includes two upper cladding layers, a first upper cladding layer and a second upper cladding layer, separated by an etching stopper layer. The second upper cladding layer includes a stripe light-guiding channel. The etching stopper layer is a single layer of a material different in composition with regard to a principal chemical element constituent from the principal chemical elements of the lower, first upper, and second upper cladding layers, and that has a refractive index very similar to the refractive index of each of each of those layers. In this Amendment, claim 1 is amended to make clear the differences in compositions.

Claims 1-3 and 7-10 were rejected as obvious over Murayama (U.S. Patent 6,424,668) in view of Shima et al. (U.S. Patent 5,420,066, hereinafter Shima). This rejection is respectfully traversed. Since claims 9 and 10 pertain to the group of claims relating to independent claim 4, it is assumed that it was intended to rejected only claims 1-3, 7, and 8 in this rejection. Therefore, the rejection with regard to claims 9 and 10 is discussed in connection with the rejection of claim 4 that appears later in this document.

According to the rejection, Murayama describes all of the elements of examined claims 1-3 with the exception that the etching stopper layer in Murayama is not AlGaAs. For that feature of the invention the Examiner resorted to Shima.

Applicants agree that Shima, commonly assigned with the present patent application, describes a semiconductor laser that includes an etch-stopping layer of AlGaAs. However, when appropriate attention is given to the language of claim 1 and to the respective materials employed by Murayama and Shima, it is apparent that no reasonable modification of Murayama with Shima can produce the claimed invention.

As described in amended claim 1, in a semiconductor laser device according to the invention, the etching stopper layer includes a chemical element that is not found in any

of the lower, first upper, and second upper cladding layers. Clearly, as acknowledged in the rejection, Murayama does not meet this requirement because all of the elements of the etching stopper layer, gallium, indium, and phosphorus, are found in every one of the lower, first upper, and second upper cladding layers. Similarly, in the structure relied upon in Shima, the etching stopper layer includes aluminum, gallium, and arsenic, elements that are found in every one of the lower cladding, first upper cladding, and second cladding layers of the Shima semiconductor laser. By contrast, in an embodiment of the invention, specifically described in claims 2 and 3, the etching stopper layer contains arsenic, an element not found in any of the lower, first upper, and second upper cladding layers.

To bridge this clear difference between the invention as described in claims 1-3, 9, and 10, and each of Murayama and Shima, reliance was placed upon a hypothetical modification of Murayama with Shima. However, one of skill in the art would never make that modification. According to that modification, the person of skill in the art would remove the etching stopper layer material from the Shima semiconductor laser, namely AlGaAs, and substitute for that material the material of the etching stopping layer in Murayama, which is GaInP. Making that modification requires consideration of changes in bandgap energy that would result and changes in lattice mismatch, important features that control how well the resulting structure functions.

In making the proposed substitution, a mixture of gallium arsenide and aluminum arsenide would be substituted for a mixture of gallium phosphide and indium phosphide. Gallium phosphide and indium phosphide have substantially different lattice constants, varying by almost 10%, so that the particular lattice constant and bandgap energy of the mixture is relatively variable. As a result, compositions can be prepared that provide a good lattice match to AlGaInP in the Murayama semiconductor laser. On the other hand, the lattice constants of the gallium arsenide and aluminum arsenide are almost identical so that achieving a near lattice match with AlGaInP materials in the Murayama laser presents difficult issues, even without considering bandgap energy mismatch issues. These considerations are not apparently taken into account in the facile substitution made in constructing the rejection of claim 1. The difficulties of lattice matching and managing

bandgap energy differences in making the substitution demonstrate that one of skill in the art would not make the modification of Murayama hypothesized in the rejection. If the Examiner should disagree, then a clear demonstration of the reason why motivation is present for the substitution and why lattice mismatch and bandgap discontinuity changes could be disregarded in making the substitution must be provided.

There is a further difference between the semiconductor laser according to the invention and any potential modification of Murayama with Shima. The semiconductor laser device according to claim 1 requires that the refractive index of the etching stopper layer be within five percent of the refractive index of each of the lower, first upper, and second upper cladding layers. Murayama is silent concerning the refractive index relationship of the layers in his semiconductor laser and supplies no reason for placing such a constraint on the relationship of the refractive indices of the respective layers.

According to the Office Action, Shima describes layers having such a refractive index relationship. Where this disclosure is found in Shima is not stated in the Office Action. Perhaps the Examiner is relying upon the potential similarity in composition between the layers of the semiconductor lasers described by Shima with respect to Figure 9 and more generally in column 5 of Shima. However, that generalized discussion has not been shown to limit the range of refractive index relationships to the express and limited range of claim 1. In other words, because of the range of compositions of materials described by Shima, Shima discloses no selectivity with respect to refractive index relationships, as in the invention. Moreover, in the semiconductor lasers described by Shima, the compositions of the layers are all AlGaAs so that the limitation of claim 1, explained more clearly in the foregoing amendment, regarding the presence of a different chemical element in the etching stopper layer, as compared to the various cladding layers, is not present anywhere within Shima.

Based on the enumerated differences between Murayama and Shima, no reasonable modification, i.e., a modification that would be made by one of ordinary skill in the art, of Murayama with Shima could produce the invention as defined by claim 1 and its dependent claims 2, 3, 7, and 8. Moreover, no teaching is found in either Murayama or Shima for the refractive index relationship of the layers mentioned in

claims 1, 2, 3, 7, and 8. Accordingly, reconsideration and withdrawal of the rejection as to those claims are respectfully requested.

Claim 4 has been amended to describe the relationship between the first and second upper cladding layers, namely that those two layers are in contact with each other. An embodiment within the scope of claim 4 is illustrated in Figure 3 of the patent application. In that embodiment, no etching stopping layer intervenes between the first and second upper cladding layers.

Claims 4-6 and claims 9 and 10 were rejected as unpatentable over Murayama in view of Shima. Claims 5, 6, 9, and 10 depend directly or indirectly from claim 4.

While a lengthy discussion could be provided with regard to the differences between the semiconductor lasers described by Murayama and Shima and the semiconductor laser described in amended claim 4, it is apparent that in both of those semiconductor lasers the first and second upper cladding layers are separated by respective etch-stopping layers. For example, in the structure described by Murayama, as acknowledged by the Examiner, the etching stopper layer 24 intervenes between the first and second upper cladding layers 22 and 26. Thus, there can be no direct contact between the first and second upper cladding layers. Likewise, in Shima, the first and second upper cladding layers 4 and 6 are separated by the etching stopper layer 5a.

Since an important feature of amended claim 4 is missing from both Murayama and Shima, no combination of those publications could supply all of the limitations of claim 4 or of its dependent claims 5, 6, 9, and 10. Accordingly, *prima facie* obviousness has not been established as to any of those claims. Therefore, further discussion of the rejection of claim 4 and its dependent claims is not necessary or provided.

Reconsideration and allowance of all pending claims are respectfully requested.

Respectfully submitted,

Jeffrey A. Wyand, Reg. No. 29,458
LEYDIG, VOIT & MAYER
700 Thirteenth Street, N.W., Suite 300
Washington, DC 20005-3960
(202) 737-6770 (telephone)
(202) 737-6776 (facsimile)

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